

Redescription of *Astyanax correntinus* (HOLMBERG, 1891) (Teleostei: Characiformes: Characidae), more than one hundred years after original description

JUAN MARCOS MIRANDE ¹, MARÍA DE LAS MERCEDES AZPELIQUETA ²
& GASTÓN AGUILERA ¹

¹ Fundación Miguel Lillo, Miguel Lillo 251, 4000 Tucumán, Argentina.
E-mail: mcmirande(at)gmail.com

² División Zoología Vertebrados, Facultad de Ciencias Naturales y Museo, Paseo del Bosque, 1900 La Plata, Argentina.
E-mail: azpeli(at)museo.fcnym.unlp.edu.ar gastonaguilera(at)tucbbs.com.ar
Correspondence to: Juan Marcos Mirande.

Abstract. *Astyanax correntinus* (HOLMBERG, 1891) is redescribed with recently collected material from the río Paraná near Corrientes city, northeast of Argentina. This species is distinguished by a combination of characters: (1) the possession of 8/6–7 transverse scales; (2) the presence of 39–42 perforated scales in the lateral series; (3) the presence of iv–v, 29–33 anal-fin rays; (4) the absence of circuli on posterior field of scales; (5) the broad silvery lateral band; (6) a small rounded humeral spot, and (7) the presence of pentacuspitate outer premaxillary teeth. Several characters are compared with those of *Astyanax pelegri* Eigenmann, 1907 from the río Paraguay, in Bahía Negra, Paraguay.

Resumen. *Astyanax correntinus* (Holmberg, 1891) es redescrita con material recientemente colectado en el Río Paraná cerca de la ciudad de Corrientes, noreste de Argentina. Esta especie es distinguida por una combinación de caracteres: (1) la posesión de 8/6–7 escamas transversas, (2) la presencia de 39–42 escamas perforadas en la serie lateral, (3) la presencia de iv–v, 29–33 radios en la aleta anal, (4) la ausencia de circuli en el campo posterior de las escamas, (5) la banda lateral plateada y ancha, (6) una pequeña mancha humeral redondeada, y (7) la presencia de dientes premaxilares externos pentacúspides. Varios caracteres son comparados con los de *Astyanax pelegri* Eigenmann, 1907 procedentes del río Paraguay, en Bahía Negra, Paraguay.

Kurzfassung. *Astyanax correntinus* (HOLMBERG, 1891) wird wieder beschrieben anhand von neuem Material aus dem río Paraná nahe der Stadt Corrientes im Nordosten Argentiniens. Die Art ist charakterisiert durch eine Kombination von Merkmalen: (1) 8/6–7 Schuppen in einer Querreihe; (2) 39–42 durchbohrte Schuppen in der Seitenlinie; (3) Anale mit iv–v, 29–33 Flossenstrahlen; (4) dem Fehlen von Circuli im hinteren Teil der Schuppen; (5) ein breites silbernes Längsband; (6) ein kleiner runder Schulterfleck und (7) fünfspitzige Zähne in der äußeren Reihe des Praemaxillare. Einzelne Merkmale werden verglichen mit denen von *Astyanax pelegri* EIGENMANN, 1907 vom río Paraguay, Bahía Negra, Paraguay.

Key words. Characiformes, Characidae, *Astyanax correntinus*, *Astyanax pelegri*.

Introduction

In the last years, many papers were published dealing with descriptions of new species of the genus *Astyanax* BAIRD & GIRARD, 1854. All descriptions used the concept of the genus given by EIGENMANN (1921, 1927) in the absence of phylogenetic studies.

In the Río de la Plata basin, near thirty nominal species of *Astyanax* have been recorded, although the placement of some species within that genus is doubtful.

One of the species described from the río Paraná is *Astyanax correntinus* (HOLMBERG, 1891) based on one specimen which is apparently lost. Several authors (among others, EIGENMANN, 1921; POZZI, 1945; RINGUELET *et al.*, 1967; GÉRY, 1978; LIMA *et al.*, 2003) have considered this species but none of them have examined specimens. The objective of this paper is the redescription of *Astyanax correntinus*, adding comparisons with *A. pelegri*.

Materials and methods

The specimens examined in this study were cleared and counterstained (C&S) following TAYLOR & VAN DYKE (1985). Measurements are straight distances taken with calliper to nearest 0.1 mm. Upper jaw is taken from snout tip to posterior margin of maxilla; maxillary length is taken from the angle between mesial and lateral maxillary processes and the posterior margin. Material is deposited in the Academy of Natural Sciences of Philadelphia, Facultad de Ciencias Naturales y Museo de La Plata, La Plata, Fundación Miguel Lillo, Tucumán, Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, and Museum d'histoire naturelle de Genève, Genève. The acronyms follows LEVITON *et al.* (1985), excepting Asociación Ictiológica, La Plata (AI) and Staatliches Museum für Tierkunde, Dresden (MTD F).

Astyanax correntinus (HOLMBERG, 1891) (Fig. 1, Tab. 1)

Material. *Astyanax abramis* (JENYNS, 1842): MLP9427, 2 ex., 102.0–113.0mm SL, Argentina, Misiones, río Paraná. *Astyanax asuncionensis* GÉRY, 1972: MLP 8660, 5 ex., 43.6–61.4mm SL, Argentina, Santiago del Estero, Bañado de Añatuya. *Astyanax chico* CASCIOTTA & ALMIRÓN, 2004: CI-FML 3837: 14 ex., 52.5–80.4mm SL, Argentina, Salta, Orán, La Bambú, río Bermejo basin, Arroyo El Oculto. *Astyanax correntinus* (HOLMBERG, 1891): FML 3826, 10 ex. (1 C&S), 68.7–75.6mm SL, río Paraná in Corrientes City; MTD F 28 784, 2 ex., 68.4–71.8 mm, same collecting data; AI 183, 62.8–80.2 mm, same collecting data. *Astyanax eigenmanniorum* (COPE, 1894): ANSP 21627–28, 2 paratypes, 42.5–49.4mm SL, Brasil, Rio Grande do Sul; MLP9160, 6 ex., 36.8–80.2mm SL, Argentina, Buenos Aires, Los Talas; MLP 2494, 13 ex., 30.0–53.1mm SL, Argentina, Córdoba, río Quinto, Barreto; AI 180, 10 ex. (1 C&S), 42.5–52.1mm SL, Brasil, Rio Grande do Sul, Viamão, açude Charolês and arroio Viuva Tereza. *Astyanax cf. fasciatus* (CUVIER, 1819): MLP 8668, 4 ex., 61.0–67.7mm SL, Argentina, Santiago del Estero, Bañado de Figueroa; MLP 8798, 17 ex., 28.8–39.6 mm SL, Argentina, Formosa, highway from Formosa to Clorinda. *Astyanax latens* MIRANDE *et al.*, 2004: CI-FML 3400, holotype, 43.0 mm SL, Argentina, Salta, río Bermejo basin, arroyo El Oculto. *Astyanax leonidas* AZPELIQUETA *et al.*, 2002: MLP 9580, holotype, 45.6mm SL, Argentina, Misiones, río Paraná basin, headwaters of arroyo Uruguay-í. *Astyanax ojara* AZPELIQUETA & GARCÍA, 2000: MLP 9470, holotype, 50.5 mm SL, Argentina, Misiones, arroyo Benítez, headwaters of arroyo Yabotí-Miní, tributary of río Uruguay. *Astyanax paris* AZPELIQUETA *et al.*, 2002.: MLP9584, holotype, 75.6 mm SL, Argentina, Misiones, río Uruguay basin, arroyo Fortaleza. *Astyanax pelegri* EIGENMANN, 1907: FML 3847, 15 ex., 53.4–75.2 mm SL, Paraguay, Alto Paraguay, Bahía Negra, río Paraguay. *Astyanax pynandi* CASCIOTTA *et al.*, 2003: MACN-ict 8543, holotype, 52.0 mm SL, Argentina, Corrientes, Esteros del Iberá, laguna Iberá, Lobo-Cua. *Astyanax saguazu* CASCIOTTA *et al.*, 2003: MLP9603, holotype, 63.0 mm SL, Argentina, Misiones, río Uruguay basin, arroyo Once Vueltas. *Astyanax stenohalinus* MESSNER, 1962: AI 132 (2 C&S), 42.6–55.7mm SL, Argentina, Buenos Aires, Punta Indio, unnamed stream, Río de la Plata basin. *Astyanax troya* AZPELIQUETA *et al.*, 2002: MACN 8310, holotype, 73.8 mm SL, Argentina, Misiones, arroyo Cuñapirú Chico, río Paraná basin. *Astyanax tumbayaensis* MIQUELARENA & MENNI, 2005: FML 3845, 57.1–75.8 mm SL, Argentina, Jujuy, Quebrada de Humahuaca between Purmamarca and Tilcara, Pozo de los Sauces. *Astyanax tupi* AZPELIQUETA *et al.*, 2003: MACN-Ict 8646, holotype, 70.1 mm SL, Argentina, Misiones, arroyo Cuñapirú in Balneario of Aristóbulo del Valle. *Ctenobrycon alleni* (EIGENMANN & MCATEE, 1907): MLP 6774, 5 ex., 50.0–64.2 mm SL, Argentina, Santa Fe, Laguna Setúbal.

Diagnosis. The species is distinguished by a combination of characters: the possession of 8/6–7 transverse scales, 39–42 perforated scales in the lateral series; iv–v, 29–33 anal-fin rays; broad silvery lateral band; short maxilla (23.2–26.7 % HL) and upper jaw (34.3–37.4 % HL); pentacuspitate outer premaxillary teeth; two or three rows of scales on anal-fin base, and the absence of circuli in posterior field of scales.



Fig. 1: *Astyanax correntinus*, ♂, 71.9 mm SL, Argentina, Corrientes, Perichón, río Paraná.

Table 1: *Astyanax correntinus* (HOLMBERG, 1891). Morphometrics of 17 topotypes. Minimum, maximum, and mean \pm standard deviation in brackets. SL is measured in mm.

	Females (n=14)	Males (n=3)
SL	62.8–80.2	69.3–71.9
% of standard length		
Predorsal distance	47.2–50.4 (49.0 \pm 1.0)	47.7–50.4 (49.3 \pm 1.4)
Preanal distance	60.7–64.1 (62.6 \pm 1.1)	60.0–62.0 (61.1 \pm 1.0)
Preventral distance	43.0–46.5 (45.1 \pm 1.0)	43.7–45.9 (44.5 \pm 1.3)
Body depth	35.6–42.1 (38.9 \pm 2.0)	37.2–40.4 (38.4 \pm 1.8)
Dorsal-fin base	12.2–15.3 (13.6 \pm 0.8)	12.2–13.7 (12.7 \pm 0.8)
Anal-fin base	33.2–38.0 (35.2 \pm 1.4)	34.4–37.1 (35.6 \pm 1.4)
Pectoral-fin length	19.9–22.1 (21.1 \pm 0.6)	21.2–21.7 (21.4 \pm 0.3)
Pelvic-fin length	15.6–18.5 (17.1 \pm 0.8)	18.0–18.4 (18.2 \pm 0.2)
Pectoral-pelvic fin origins	19.1–21.6 (20.4 \pm 0.7)	19.4–20.5 (19.9 \pm 0.6)
Pelvic-anal fin origins	17.4–20.2 (18.9 \pm 0.9)	17.5–18.7 (18.3 \pm 0.7)
Head length	23.9–26.3 (25.3 \pm 0.7)	25.2–25.8 (25.4 \pm 0.4)
Peduncle depth	9.8–11.4 (10.6 \pm 0.4)	10.3–10.7 (10.5 \pm 0.2)
Peduncle length	11.5–12.7 (12.0 \pm 0.4)	12.3–12.9 (12.6 \pm 0.3)
% of head length		
Orbital diameter	38.2–43.3 (40.1 \pm 1.4)	38.4–42.5 (40.4 \pm 2.1)
Interorbital width	31.2–36.2 (33.6 \pm 1.4)	31.0–33.9 (32.9 \pm 1.6)
Postorbital length	38.9–41.7 (40.8 \pm 0.7)	39.8–40.5 (40.2 \pm 0.4)
Snout length	24.4–29.4 (27.8 \pm 1.6)	26.0–29.1 (27.3 \pm 1.6)
Maxillary length	23.2–26.7 (24.7 \pm 1.0)	24.1–25.3 (24.9 \pm 0.7)
Premaxillary+max. length	34.3–37.4 (35.8 \pm 1.1)	34.8–36.6 (35.8 \pm 0.9)

Description. Morphometrics of 17 specimens are presented in Table 1. *Astyanax* with deep body (Fig. 1), maximum body depth at dorsal-fin origin. Dorsal profile of body slightly convex from snout to eye, concave over eyes, curved and convex from this point to dorsal-fin origin, slanted ventrally under dorsal-fin and slightly convex between dorsal and adipose fins; slightly concave on caudal peduncle. Ventral profile of caudal peduncle slightly convex. Ventral profile of body strongly curved from tip of snout to pelvic-fin origin or to anal-fin origin, and slanted dorsally to caudal peduncle.

Dorsal-fin origin nearer tip of snout than base of caudal-fin rays. Pelvic-fin origin anterior to vertical through dorsal-fin origin. Adipose fin anterior to vertical through posterior anal-fin rays. Anal-fin origin very close to vertical through last dorsal-fin ray insertion. Tip of pectoral fin usually not reaching pelvic-fin origin, sometimes scarcely surpassing that point. Tip of pelvic fin not reaching anal-fin origin, although near in few specimens.

Dorsal fin bearing iii, 9 rays; posterior margin of dorsal fin straight, first branched dorsal-fin ray longest, its tip falling near half way between posterior dorsal-fin ray insertion and adipose fin. Anal fin with iv–v, 29–33 rays (29 = 6 ex.; 30 = 1 ex.; 31 = 4 ex.; 32 = 2 ex.; 33 = 2 ex.). Posterior anal-fin margin straight, with exception of last unbranched and first four or five branched rays that forms a small lobe. Only two specimens with anal fin bearing hooks directed posteriorly, located on last branch of about 18 rays; one pair on each segment.

Caudal fin bearing 1 unbranched and 9 branched principal rays in upper lobe; 8 branched and one unbranched principal rays in lower lobe. Usually caudal lobes similar in length; the lower one slightly wider.

Pectoral-fin with i, 12–14 rays (12 = 3 ex.; 13 = 9 ex.; 14 = 3 ex.); posterior margin slightly rounded. Pelvic fin with i, 7 rays; hooks developed only on tips of three median branched rays. Posterior margin rounded.

Head length moderate, mouth terminal, horizontal; snout short. Upper jaw slightly longer, visible in ventral view. Premaxilla with short ascending process, bearing two series of teeth. Three to five pentacuspitate teeth in outer series (3 = 1 ex.; 4 = 12 ex.; 5 = 2 ex.), central cusp larger. Inner series of premaxillary teeth consisting of 5 teeth, expanded distally, slightly compressed at distal tips, with cusps forming a strong arch concave anteriorly. Symphyseal tooth narrower and deeper, with 4 or 6 cusps. Second and third teeth widest, with 7 cusps. Fourth and fifth teeth smaller, with 5 cusps. In all teeth, central cusp slightly larger than remaining ones. Maxilla short, scarcely reaching vertical through anterior orbital margin; lateral process placed almost vertically. One compressed maxillary tooth, with broad base and seven small cusps. Dentary bearing three large teeth, fourth tooth large or median sized, and until six very small ones. Symphyseal tooth little narrower, with 5–6 cusps. Second, third and fourth teeth with 3–5 cusps, remaining ones conic.

Eye large, interorbital wide. Six infraorbitals well developed; third infraorbital almost contacting sensory tube of preopercle.

Scales cycloid, with anterior margin slightly undulated. Lateral series with 39–42 perforated scales (39 = 7 ex.; 40 = 4 ex.; 41 = 3 ex.; 42 = 1 ex). Eight scales between dorsal-fin origin and lateral line; 6–7 between lateral line and ventral-fin origin. Fifteen or sixteen scales around caudal peduncle. Eleven to 14 scales forming an irregular row between supraoccipital process and dorsal-fin origin; sometimes, 11 scales in a regular row. Eighteen to 25 scales placed on anal-fin base, covering all unbranched and near 22 branched anal-fin rays. Scales placed on three rows anteriorly and two rows posteriorly.

First branchial arch bearing 21–23 gill-rakers: 2 on hypobranchial, 11–12 on ceratobranchial, 1 on cartilage, and 7–8 on epibranchial.

Colour in alcohol. Background light, dorsal region of flanks scarcely darker. A small and diffuse rounded humeral spot surrounded by a clear area; a very faint concentration of chromatophores at beginning of lateral stripe. A silver, broad lateral band finishing on posterior area of caudal peduncle. A dark, narrow line of chromatophores running from tip of supraoccipital process to caudal peduncle. Most specimens with faint spot on caudal fin, sometimes concentrated on middle rays and sometimes spread across caudal fin.



Fig. 2: *Astyanax pelegri*, ♂, 61.0 mm SL, Paraguay, Alto Paraguay, Bahía Negra, río Paraguay.

Dark chromatophores on first dorsal-fin ray and distal margin of caudal fin; anal, pectoral, and pelvic fins hyaline.

Distribution and habitat. The species is known from río Paraná in Perichón, near Corrientes City. HOLMBERG (1887) related several trips in which he collected different animals, including fishes. In the province of Corrientes, he only stayed at the Capital District and its vicinity; this information is useful because it indicates that HOLMBERG collected the specimen of *A. correntinus* near Corrientes City, the capital district of the province, as the specimens studied herein. This additional material was collected with trawl net, at night. The place where these specimens were captured has sandy bottom and slow flowing water.

Discussion

HOLMBERG (1891) described *A. correntinus* with one specimen from the río Paraná, in Corrientes, Argentina. The specimen was housed at the Escuela Normal Superior Nro. 1, in Buenos Aires City, where the author worked. Most of the material studied by HOLMBERG was carried to Paris for an exhibition in 1910 and the destiny of the material after that travel is unknown (information obtained by MMA in this school some years ago).

As many of the authors of the 19th century, HOLMBERG made a brief and simple description of his new species. Nonetheless, HOLMBERG mentioned the presence of 42 scales in the lateral line and 8/7 transverse scales. Both numbers of scales represent a combination that is not present in other species of *Astyanax* from the Paraná basin. The specimens recently collected near Corrientes City, in the río Paraná, have both number of scales and also have other characters cited in the original description, as the dorsal profile concave over eyes, curved from eyes to dorsal-fin origin, straight and slanted ventrally under dorsal fin and very gently convex between dorsal and adipose fin. The ventral profile is curved from snout to anal fin origin. Also, HOLMBERG (1891) mentioned 45 anal-fin rays but we assume that this number is a typographic mistake instead of 35 which is the most common number present in the examined specimens. *Astyanax pelegri* EIGENMANN, in EIGENMANN, McATEE & WARD 1907 (Fig. 2) is the most closely related species in external morphology and pigmentation pattern, including the narrow line of chromatophores in the dorsal midline. EIGENMANN (1921) pointed out that both species were very similar, probably the same. *Astyanax correntinus* and *A. pelegri* were included as *species inquirendae* within the genus *Ctenobrycon* (LIMA *et al.*, 2003).

We consider both species as *Astyanax* because they do not have “ctenoid scales which are especially rough on the breast” (EIGENMANN, 1908) which is the diagnostic character of the

genus *Ctenobrycon*. The presence of ctenoid scales in *C. alleni* (EIGENMANN & McATEE, 1907), a species present in the rivers Paraguay and Paraná, differentiates it from *A. correntinus* and *A. pelegri*.

The examination of specimens of *A. pelegri* from the río Paraguay in Bahía Negra and recently collected specimens of *A. correntinus* allow us to compare and demonstrate that both are valid species. Different measurements, counts, and external morphology are discussed below whereas ongoing morphological studies (JMM in prep.) will consider their phylogenetic relationships.

Astyanax pelegri has smaller scales, thus the number of transverse scales (11–12/7–8 vs 8/6–7) and also the number of scales around peduncle (19–20 vs. 15–16) is higher than in *A. correntinus*. *Astyanax pelegri* has 46–52 perforated lateral scales whereas *A. correntinus* has 39–42. The total number of anal-fin rays varies from 41 to 47 in *A. pelegri* and 33–38 are present in *A. correntinus*, usually 35. Three rows of scales are located along the base of anal-fin rays of *A. pelegri* and two series of larger scales are present in *A. correntinus* excluding the anterior portion where there are also three rows. In addition, *A. pelegri* has five teeth in the outer row of the premaxilla with the third one out of line as mentioned in the original description. *Astyanax correntinus* has 3 to 5, usually four teeth forming a line. The anal-fin origin of *A. pelegri* is located under last third of dorsal fin and the same insertion is placed posterior to last dorsal-fin ray insertion in *A. correntinus*. *Astyanax pelegri* has a partially naked area between supraoccipital and the origin of dorsal fin and this area is covered by scales in *A. correntinus*. The number of gill-rakers in the first branchial arch is 21–23 in *Astyanax correntinus*, and about 28 in *A. pelegri*. The scales of *A. correntinus* do not have circuli in the posterior field, whereas in *A. pelegri* those circuli are present. Also, *A. correntinus* has a shorter anal-fin base (33.2–38.0 vs. 39.0–42.9 % SL), a shorter pectoral fin (19.9–22.1 vs. 21.9–24.3 % SL), a longer distance between pectoral and pelvic fins (19.1–21.6 vs. 15.8–18.7 % SL), a longer maxilla (23.2–26.7 vs. 18.1–21.6 % HL), and a longer upper jaw (34.3–37.4 vs. 30.5–34.4 % HL) compared to *A. pelegri*.

Astyanax correntinus and *A. pelegri* can be distinguished from almost all remaining species of *Astyanax* from the Paraná-Plata basin for the higher number of branched anal-fin rays (29–42). In the ríos Paraguay and lower Paraná only *A. cf. fasciatus*, *A. latens*, *A. asuncionensis*, and *A. abramis* have similar number of anal-fin rays. *Astyanax correntinus* and *A. pelegri* are readily distinguishable from *A. fasciatus* and *A. latens* by the anal-fin scales sheath formed by two or three rows of scales, covering most of the anal-fin base, formed by a high number of scales (about 20) versus one row with 10 scales or a little more, covering up to one third of the anal-fin base. *Astyanax correntinus* and *A. pelegri* are distinguished from *A. asuncionensis* and *A. abramis* by the absence of a well defined, black, horizontal humeral spot and the presence of one maxillary tooth, absent in *A. asuncionensis* and *A. abramis*.

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